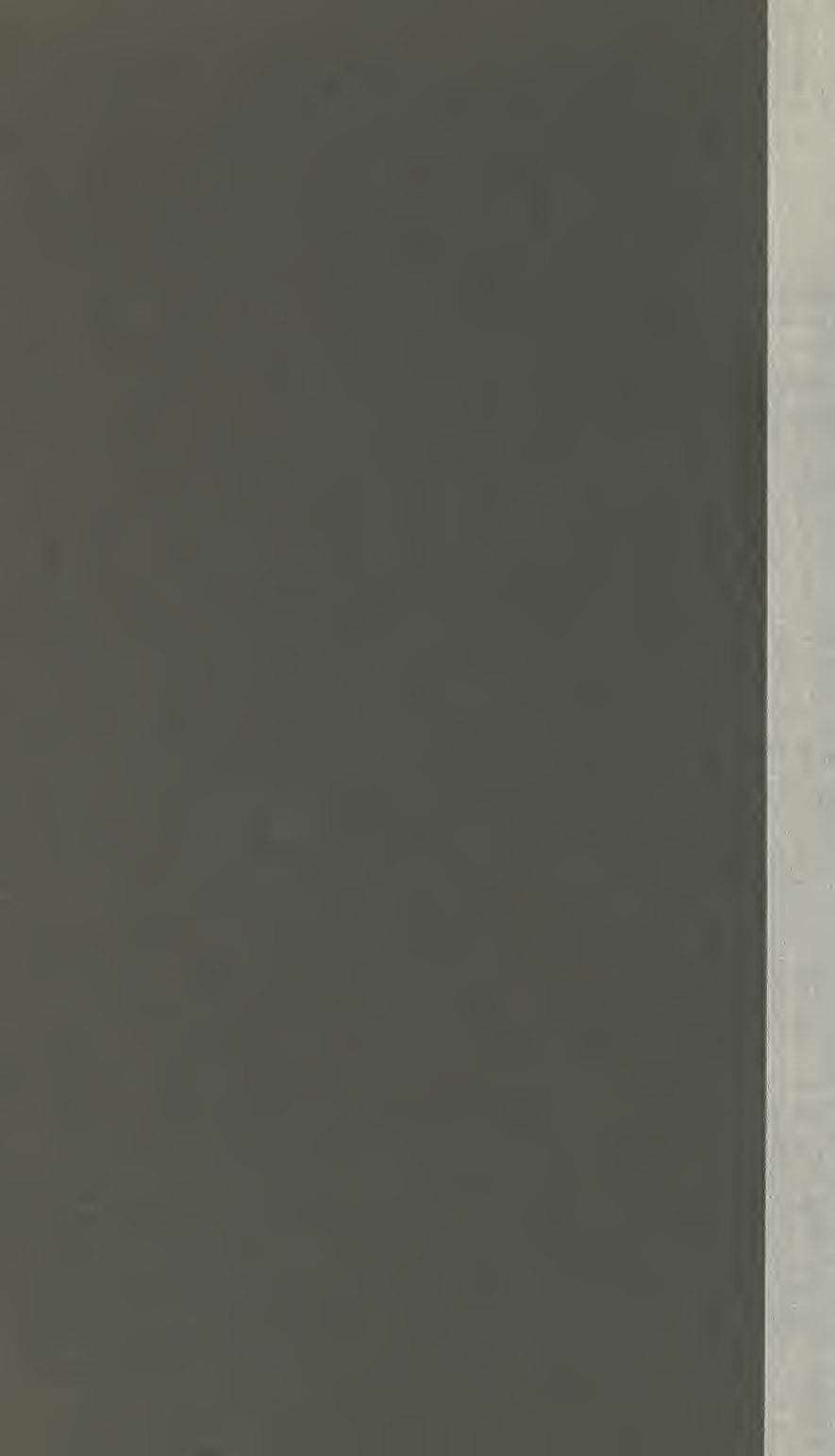


Geddes, (Sir) Patrick
The classification of
statistics and its results

HA
29
G4



2181 with the Author's Compliments

THE
CLASSIFICATION OF STATISTICS
AND ITS RESULTS.

BY

PATRICK GEDDES, F.R.S.E.,

LECTURER ON ZOOLOGY IN THE SCHOOL OF MEDICINE, EDINBURGH,
AND DEMONSTRATOR OF BOTANY IN THE UNIVERSITY.

*(From the Proceedings of the Royal Society of Edinburgh, vol. xi.
Read March 21, April 4, and May 2, 1881).*

EDINBURGH: A. & C. BLACK.

1881.

THE
CLASSIFICATION OF STATISTICS
AND ITS RESULTS.

BY
PATRICK GEDDES, F.R.S.E.,
LECTURER ON ZOOLOGY IN THE SCHOOL OF MEDICINE, EDINBURGH,
AND DEMONSTRATOR OF BOTANY IN THE UNIVERSITY.

*(From the Proceedings of the Royal Society of Edinburgh, vol. xi.
Read March 21, April 4, and May 2, 1881).*

EDINBURGH: A. & C. BLACK.

1881.

HA
29
G4

NEILL AND COMPANY, EDINBURGH,
GOVERNMENT BOOK AND LAW PRINTERS FOR SCOTLAND



THE CLASSIFICATION OF STATISTICS AND ITS RESULTS.

§ 1. Every one may readily notice that the collection of statistical information goes on around us to a vast and constantly increasing extent; not simply in the periodic census, but in the daily labours of the Registrar-General's Department, of the Board of Trade, and the like. Such functions are carried on in every civilised country by many special statistical bureaux; a statistical society exists in almost every great intellectual centre, and an International Statistical Congress, which has proposed to itself the vast object of accumulating, co-ordinating, and comparing the whole body of national statistics, has met periodically since 1853.

Though no one will probably question the desirability and usefulness of such a task, it may be well to point out that in the words of a veteran statistician *—"By this means light will be thrown on every branch of statistical science. All social phenomena of every kind may be investigated by comparisons of the different causes from which they arise, under different conditions, and in countries presenting wide spheres of observation and opposing influences at work. Knowledge will thus be increased, laws of social life eliminated, true scientific inquiries promoted, the work of government simplified, and the progress and prosperity of nations fixed upon sure bases of observation and reason, instead of dangerous experiments or doubtful theories."

Again, regarding the importance of uniformity (*i.e.*, of orderly classification) in all statistical publications, the same authority † has insisted that "What was wanted, above all things, was uniformity.

* S. Brown, F.S.S., "Report on the Eighth International Statistical Congress, St Petersburg, 1872"; Journ. Statist. Soc. Lond., vol. xxxv., Dec. 1872, p. 457.

† Quoted by Mouat, "Prelim. Report of Ninth International Statistical Congress, held at Buda-Pesth, 1876"; Journ. Statist. Soc. Lond., vol. xxxix., Dec. 1876, p. 645.

Hundreds, we might say thousands, of volumes—collected and printed at great expense by the different Governments, by societies, or by individuals, were rendered almost useless, in an international point of view, for want of some uniform method of classifying and showing the results. It was impossible to make comparisons, and so to educe the laws of probability of occurrence of large classes of events in social or political economy. Yet, without the discovery of these laws, the social, moral, and intellectual condition of a people cannot with any certainty be traced.”

§ 2. It thus becomes necessary to examine and compare the modes of classification of statistics actually in use in the statistical annuals of different countries. This has been done by M. Deloche,* chief of the Statistical Department of the Ministry of Agriculture and Commerce, and also by Dr Mouat, Foreign Secretary of the Statistical Society of London † ; and it will be useful to borrow a few examples, placing the condensed headings in parallel columns. (See opposite page.)

§ 3. After pointing out the utter discord which exists among these systems, and the necessity of some fundamental scientific idea to introduce uniformity, Deloche goes on to propose a classification, based upon the idea of the human organisation. Of this classification a detailed account is given by Mouat, from whom the following summary also is borrowed:—

I. *Double Synthesis of the Territory and its Population.*

1. Territory (topography, geology, hydrography, meteorology).
2. Census and movement of population.

II. *Facts relating to the Exercise of the Moral Faculties.*

1. Religion.
2. Civil and criminal justice.
3. Prisons and penitentiary establishments.
4. Public aid.
5. Benefit societies.

(Continued on page 6.)

* Quoted by Mouat, “Report on the Fourth Session of the Permanent Commission of the International Statistical Congress, held in Paris, 1878” ; Journ. Statist. Soc. Lond., xlii., p. 12.

† *Ibid.*

BELGIUM.	AUSTRIA.	HUNGARY.	UNITED KINGDOM.	COLONIAL AND OTHER POSSESSIONS.	BRITISH INDIA.
I. <i>Territory and Population.</i> 1. Territory. 2. Population. II. <i>Political, Moral, and Intellectual State.</i> 1. General Elections. 2. Provincial Elections. 3. Communal Elections. 4. Provincial Administration. 5. Criminal Administration. 6. Primary Instruction. 7. Higher Education. 8. Letters and the Fine Arts. 9. Worship. 10. Medicine. 11. Benevolent Institutions. 12. Civil Justice. 13. Criminal Justice. 14. Civil Guards. 15. Militia. 16. Army. III. <i>Agriculture, Industry, Commerce.</i> 1. Agriculture. 2. Industry. 3. Commerce. 4. Banks, &c., Mints. 5. Communication. 6. Post and Telegraphs.	1. Superficies, population, dwelling-places, movement of population. 2. Rural economy, cattle, market prices, extractive industry. 3. Manufacturing industry, commerce. 4. Railways, roads, river and sea navigation, post office, telegraphs. 5. Clergy, education, press. 6. Civil and criminal justice, &c. 7. State administration, public debt, &c., communal administration. 8. Joint-stock Cos. banks, sale of property and mortgages. 9. Savings banks. 10. Hygienic and charitable institutions, fires. 11. Army and navy.	1. Movement of the population. 2. Rural economy. 3. Mines. 4. Movement of commerce, market prices. 5. Modes of communication. 6. Fires. 7. Public health. 8. Justice. 9. Worship and public instruction. 10. Government.	1-12. Public and local revenue and expenditure, national debt, income-tax, customs, tariffs, &c. 13-14. Imports and exports. 15-21. Imports. 22-29. Exports. 30-31. Bullion. 32-35. Transshipments. 36-42. Shipping. 43-44. Excise. 45-46. Prices and sale of corn. 47. Acreeage under crops and live stock. 48. Coinage. 49. Post office savings banks. 50. Savings banks under trustees. 51-57. Bank of England. 58-61. Post-office. 62. Population. 63. Births, marriages, deaths. 64-65. Education. 66-69. Paupers. 70. Crime. 71. Emigrants. 72. Railways. 73. Mines.	1. Area and population. 2. Revenue. 3. Expenditure. 4. Public debt. 5. Shipping. 6. Imports. 7. Exports. 8. Banks. 9. Railways. 10. Agriculture. 11. Births, deaths, and marriages. <i>Australian Colonies.</i> 12. Meteorology. 13. Import duties. 14. Export duties.	1-19. Area and population. 20-37. Revenue and Expenditure, debts and obligations, provincial and local finance, municipalities. 38-43. Shipping. 44-45. Imports. 46-49. Exports. 54-56. Government stores. 57-60. Gold and silver. 61-62. Customs Tariffs. 63. Coinage. 64-68. Paper currency. 69. Emigrants. 70-79. Guaranteed and State railways. 80-83. Public works. 84. Telegraphs. 85-92. Post-offices. 93-98. Army. 99-100. Education. 101. Publications. 102. Vaccination. 103-104. Wild beasts.

III. *Facts relating to the Exercise of the Intellectual Faculties.*

1. The three degrees of public instruction.
2. Literary and scientific productions, printing, books, libraries, museums ; newspapers and reviews.
3. The fine arts.

IV *Facts relating to the Application of the Physical Faculties and of the Intellectual Faculties to Natural Objects.*

1. Agriculture.
2. Lands built upon and land without buildings.
3. Extractive and manufacturing industry. Fisheries.
4. Professions and salaries.
5. Means of communication.
6. Commerce and navigation.
7. Public works, public health, and the food supply of towns.
8. The circulation of men, of things, of valuables, and of thought. Post offices and telegraphs.
9. Credit institutions (except State banks).
10. Accidents and assurances.

V. *Facts common to the three above-mentioned orders of faculties.*

1. Political rule, its organs and assemblies.
2. General administration.
3. Administration and assemblies of provinces, departments, districts, communes, and minor subdivisions.
4. Army.
5. Navy.

VI.

1. The finances of the State.
2. The finances of provinces or departments.
3. Finances of communes or inferior districts. Town dues and articles consumed.
4. State banks—*les caisses de dépôts*—mints.

VII. *Colonies or Extra Continental Possessions.*

Dr Mouat, while admitting this scheme to be “undoubtedly the best attempt yet made to reduce to order and precision that which

is at present deficient in both these qualifications," yet holds it to be impracticable, since it is doubtful whether there could be any approach to general consent, either as to the divisions themselves or to the subdivisions placed in each. M. Deloche's fifth division seems to him to be fatal to the plan, and the reader will readily notice many other objections.

§ 4. He then goes on to suggest a temporary and provisional classification, which is summarised as follows :—

"I. Territory and Population.

"All geographical and demographical statistics, including areas, soils, climates, possessions, and territorial arrangements, movements and divisions of the population, and the purely social arrangements, such as trades, professions, &c., everything contained in the registrar-general's returns, and what is beginning to be known as sociology generally.

"II. Revenue and Commerce.

"All the sources of the collection, production, and distribution of wealth, the statistics of the precious and other metals, all facts relating to the use and abuse of money, exchange operations, all manufactures and industries, and commerce in its widest sense, including means of transport, navigation, &c., &c.

"III. Laws and Government.

"All relating to legislation and policy of nations, which would include the making and breaking of laws, the constitution of imperial and local governing bodies, armies, navies, police forces, and the like; education and religion, and all facts tending to show the state of civilisation of each nation as distinguished from other nations.

"IV. Miscellaneous (arranged alphabetically).

Such an arrangement is, of course, as Dr Mouat indeed admits, the despairing abandonment of all pretence of scientific arrangement; and it is curious to notice that this—the latest development of statistical classification,—is closely analogous, save for the *omnium gatherum* with which it concludes, to that earliest classification with which botanists commenced their labours, that of the

vegetable world into herbs, shrubs, and trees. Under these circumstances the interference of the naturalist may be less impertinent than might at first sight seem probable.

§ 5. Before attempting classification, it is necessary to come to some definite agreement as to the nature of statistics; and after laying aside the popular belief that it is an inexpressibly dreary accumulation of numbers by which anything whatever may be proved, we find that at least two hundred non-coincident definitions have been given by statisticians. Many of these assert statistics to be a *science*, many again regard it as a *method*; while some, including the most recent foreign authorities, claim that it is at once both. But the sciences (using even the widest classification, that of Herbert Spencer) are logic, mathematics, physics, chemistry, astronomy, geology, biology, psychology, sociology, and ethics; the methods of science (according to Bain) are simply observation and definition (classification), induction and deduction. We do not find statistics in either category. Some statisticians, however, hold the sound view that statistics is simply a quantitative record of the observed facts or relations in any branch of science,* and I have ventured to condense and define this view into a diagram, as follows:—

Record of Facts (at given time).

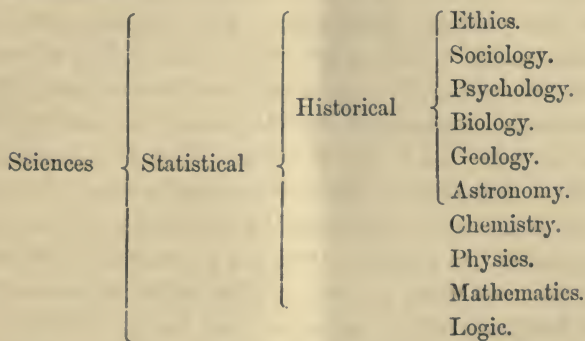
Qualitative	Quantitative			
Verbal	Numerical	Linear	Plane	Solid
Statements.				
		{ Graphic } Statistics.		

§ 6. If this definition be correct, we obtain history by superposing or combining successive records, and this view is identical with that

* For a valuable discussion of recent opinion as to the nature of statistics, in which this latter view is substantially maintained, see Hooper, "On the Method of Statistical Analysis"; Journ. Statist. Soc. Lond., vol. xlv., March 1881.

expressed in the famous aphorism of Schlözer, one of the earliest writers on the subject—"Statistics is history in repose, history is statistics in movement." Applied to sociology, it practically agrees too, with the division of the subject into social statics and social dynamics established by Comte.

§ 7. The field of history might at first sight seem co-extensive with that of statistics, and both might seem to extend to all the sciences ; but since logic involves no idea of quantity, and since mathematical, physical, and chemical conditions and properties are constant, the scope of statistics and history becomes restrained, as shown in the following diagram :—

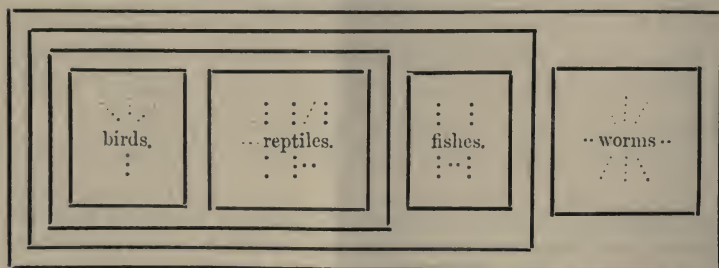


It is thus clear that statistics and history are, within the above limits, the common property of the sciences, and that the current use of these words, which restricts them to social phenomena, is simply one of colloquial convenience, while their use in the sense of distinct sciences or of distinct scientific methods is entirely erroneous.*

§ 8. Statistics being thus defined, the need for collection and classi-

* The preceding general conceptions may be traced into interesting detail. The application of the above diagrammatic definition of statistics to all the sciences clearly illustrates the continual progress which goes on in each from mere qualitative to quantitative knowledge, and the increase of definiteness which qualitative knowledge is always tending to assume. For instance, the name of a chemical compound, say sulphate of iron, expresses only a qualitative relation, its ordinary chemical formula FeSO_4 reaches the numerical state, its graphic and glyptic formulæ are respectively the plane and solid representation of the same *statistic*, as we may conveniently term any such relation of quantity. So, too, the astronomer has his star-maps and orrery, the geologist his maps and models, the biologist his figures and diagrams, while the sociologist so often requires similar aid that the French Government has recently established a *Bureau de Statistique graphique*. So by piling up successive graphic representations of statistical observations, a solid historical

fication being granted, and the unsatisfactoriness of existing and proposed schemes of classification being shown, we must now proceed to consider the desiderata of a system of classification. Our classification must be natural, not artificial; must be capable of complete specialisation, so as to include the minutest details, and capable, too, of the widest generalisation; it must be universal in application, and it must be, as far as possible, simple of understanding, and convenient in use. But how shall we obtain such a classification? What phenomena in the whole field of human knowledge have as yet been classified in this way? A moment's consideration will show that it is biological science which alone answers the question satisfactorily. None of the preliminary sciences is wanting in order or definiteness, but to biology above all is presented the problem of an innumerable multitude of actual phenomena demanding arrangement. Take an instance from zoology. Birds and reptiles, fishes and worms, are groups which the common sense of probably every rational human being enables him to form with considerable approach to correctness; yet at this point the task of the zoologist is only beginning. He has to work in two directions, to specialise until every member of these groups is known in the greatest detail, and also to generalise these groups into larger and larger ones. The two lines of research may be represented thus:—



letting the dots represent the details of the various groups, and the large rectangles the successive generalisations which combine model might often be constructed. A geologist, for instance, by piling map upon map of a given island at successive times (the margin being of course removed) would thus construct a solid model which would clearly exhibit the changes throughout the whole period. Where the area was increasing per unit time, the solid would widen upwards and overhang its base; where decreasing it would narrow, and thus even the minutest local increase or decrease would be represented with extreme vividness.

these into larger and larger alliances. Such a method of classification is obviously, therefore, that of which we are in search. It accepts our ordinary conceptions as far as possible, and systematises them; it is in real accordance with the order of nature, it pushes specialisation and generalisation to the uttermost limits of possibility, it is universal in application, and, as far as possible, simple of understanding and convenient in use.

§ 9. Using, therefore, the ordinary method of the classificatory sciences, let us take a concrete case—let us examine some actual statistics. For this purpose nothing is better than the useful little *Annuaire*, published by the *Bureau des Longitudes*.^{*} Some of its principal contents are as follows:—Calendar, times of eclipses, sunrise and sunset, tides, &c.; tables of weights, measures, and money; heights of mountains, depths of rivers; superficies and population of European and other countries, special statistics of France, her colonies and Paris, laws of mortality, &c. Then come “*Tables diverses*” in great number, of which the few following instances will suffice:—Magnetic inclination, chemical elements, specific gravities of elements, rocks, gems, thermo-chemistry, velocity of sound, indices of refraction.

At first there is no difficulty. We simply separate out in order the statistics of each of the preliminary sciences, physical, chemical, astronomical, geological (including geographical, meteorological, &c.), and leave these to their special cultivators. It will be noticed that even this simple step disposes of a not inconsiderable part of the actual statistics of various countries (*e.g.*, see *Austria, Colonies*, &c., p. 5). Social statistics now alone remain; how are they to be classified in accordance with our canons?

§ 10. Let us first inquire what is the fundamental scientific idea of a society. Some statisticians and economists answer exchange, others division of labour, others find it in history, others in the rights of man or the like. This diversity of opinion makes it unnecessary to criticise each in detail, and we are thrown back upon our own resources—our knowledge of the preliminary sciences. Just as the biologist is accustomed to classify man along with inferior organisms, and to trace the fundamental resemblances in structure and function which his organisation presents to theirs, so he may reasonably inquire

^{*} Paris: Gauthier-Villars.

wherein human society resembles the societies formed by the lower animals, the more so as no one disputes that these fall strictly within his province.* As the term society indeed assumes, some general truths must be common to societies of *Formica*, *Apis*, *Castor*, and *Homo* alike—to ant-hill, bee-hive, beaver-dam, and city, and this must therefore underlie our classification of social facts.

§ 11. First, then, a society obviously exists within certain limits of time and space. Secondly, it consists of a number of living organisms. Thirdly, these modify surrounding nature, primarily by seizing part of its matter and energy. Fourthly, they apply this matter and energy to the maintenance of their life, *i.e.*, the support of their physiological functions.

It is here clearly to be understood that no attempt is made completely to define a society. A society may be much more than all this, in which case more general truths are discoverable, but in any case these four generalisations are obviously true, neither hypothesis nor metaphysical principle being involved. These will therefore henceforth be termed sociological axioms. What aid can they afford us?

§ 12. They enable us to classify out the facts relating to each and every society as follows :†—

(A.) Those relating to the limits of (1) time and (2) space occupied by the given society.

(B.) Those relating to the matter and energy utilised by the society from surrounding nature.

(C.) Those relating to the organisms composing the society.

(D.) Those relating to the application of the utilised matter and energy by the given organisms.

* “The Biological sciences are those which deal with the phenomena manifested by living matter; and though it is customary and convenient to group apart such of these phenomena as are termed mental, and such of them as are exhibited by men in society under the heads of Psychology and Sociology, yet it must be allowed that no natural boundary separates the subject matter of the latter sciences from that of Biology. Psychology is inseparably linked with Physiology; and the phases of social life exhibited by animals other than man, which sometimes curiously foreshadow human policy, fall strictly within the province of the biologist.”—Huxley, “Anatomy of Invertebrated Animals,” London, 1877, p. 1, Introduction.

† For better agreement with the order of the sciences (see p. 9), it is convenient to transpose the classes of facts derived from the second and third axioms.

§ 13. We may now proceed briefly to discuss these in order, not tracing them into more detail than is essential for clearness.

A. (1.) Of the extreme limits of time either or both may or may not be known, but the time at which our record of facts is taken can be, and usually is, stated definitely at the outset as a date.

(2.) Limits of space. Leaving all purely physiographical questions to the preliminary science of geology, the essentially social space relations may be arranged as follows:—

A. Territory of given society.

I. Quantity at given time.

1. Persistent since last unit time.

2. Added since last unit time.

(a) By geologic agency (upheaval, deposition, &c.).

(b) By social agency (discovery, conquest, reclamation, purchase, &c.).

II. Quality at given time.

1. Unused.

2. Used.

(a) Unspecialised (for such and such functions).

(b) Specialised (for such and such functions).

III. Decrease since last unit time.

1. By geologic agency.

2. By social agency.

§ 14. Let us now pass to the body of facts which our third axiom enables us to co-ordinate—those (B) relating to the matter and energy utilised by the given society.

The primary sources of energy in nature, so far as we at present know, are four—first, the primitive chemical affinity of the uncombined elements; secondly, the internal heat of the earth; thirdly, the rotation of the earth; fourthly, the sun. Of these the last is, of course, by far the most important; and its energy exists either active in sunshine, moving air, or water, or latent in the earth's crust, or in the organisms surrounding or composing society. The energy of the earth's rotation has been used to some small extent in tide-mills; that of the earth's internal heat, as manifested in hot springs, volcanoes, &c., of course still less; while the

first source, that of primitive chemical affinity, is scarcely used at all, since the elements (with the partial exception of sulphur) are desired for the sake of other properties than their capacity of yielding energy.

The next portion of the same table, that intended for the arrangement of our knowledge of the substances used, not for the production of energy, but for the sake of their physical, chemical, physiological, or other properties, may most simply be divided according as the substances are animal, vegetable, or mineral. The mineral sources may conveniently be grouped as non-metallic, metallic, rocks, and soils; the vegetable and animal by natural groups. But the matter and energy seized from nature are mere raw materials, as yet unfitted for application to the maintenance of the society. From this state, in which they may be termed potential products, they must be developed into that of ultimate products. And a little consideration will show that this process of development has generally three stages,—the first, of exploitation, including agriculture, mining, engineering, &c.; the second, of manufacture; the third, of movement by the agencies of transport and exchange to the place of ultimate application to the wants of the society—protection, alimentation, nervous stimulus, &c. These propositions are exhibited and somewhat extended in Table B I.*

§ 15. In complex societies, however, a large proportion of raw materials has to be converted into apparatus for service in exploitation, manufacture, and transport; these may be termed mediate products. We have now the main principles of an exhaustive classification of all products whatsoever; thus—

a. Potential Products.

See Table B I.

β. Mediate Products, used in—

1. Exploitation.
2. Manufacture.
3. Movement.

(a) Transport.

(b) Trade.

γ. Ultimate Products.†

* This table is essentially borrowed from Tait and Balfour Stewart. See Balfour Stewart, "Elementary Treatise on Heat."

† The details of the above classification would involve the printing of a con-

§ 16. A farther large proportion of energy and matter is prematurely dissipated and disintegrated by various agencies, and at various stages of development, and thus never becomes used at all. Such premature dissipation is termed loss, and of course needs to be balanced against the gain recorded in the two preceding tables. The details arrange themselves as follows :—

Loss	{	1. Of raw materials	}	by	1. Physical agencies, <i>e.g.</i> ,
		2. In exploitation			Avalanche.
		3. In manufacture			Earthquake.
		4. In transport			Volcano.
		5. In exchange			Flood.
		6. Of ultimate products			Storm, &c.
		7. In remedial effort			2. Biological agencies, <i>e.g.</i> ,
					Insects.
					Fungi, &c.
					3. Social agencies, <i>e.g.</i> ,
					Crime.
					War.
					Folly, &c.

§ 17. The second axiom—that a society consists of living organisms—leads us to the classification of their statistics. These arrange themselves in a way very analogous to that used for the statistics of territory (see p. 13, and Tables A I., II., III.) as follows :—

C. Organisms composing society.

I. Number at given time.

1. Surviving since last unit time.
2. Added since last unit time.
 - (a) By birth.
 - (b) By immigration.

siderable number of minor tables, and are therefore omitted, as tending to exceed the limits and divert attention from the main purpose of the present paper.

II. Quality at given time,

1. *Biological.*

(a) Structural.

a. Ethnological.

(Race, aspect, &c.).

β. Anthropometric.

(Size, weight, &c.).

(b) Functional.

a. Efficiency of non-cerebral functions.

β. Efficiency of cerebral functions (*Psychological*).

(c) Distributinal.

2 *Social.*

(a) Mutual relations.

III. Decrease since last unit time.

1. By death.

2. By emigration, &c.

§ 18. Since the organisms composing the society have by our first axiom certain time-relations, since by our third axiom they seize upon the matter and energy of nature, a new idea comes in, that of their occupations. In a complex society like the human, more time-relations or occupations are to be observed than those which concern the direct utilisation of nature. By the aid of these considerations and of the preceding tables, the occupations arrange themselves as follows :—

I. Operations on matter and energy, *i.e.*, concerned in

1. Exploitation.

2. Manufacture.

3. Movement.

(a) Transport.

(b) Trade.

II. Operations on organisms composing given society.

1. Service of non-cerebral functions.

(a) Menial, domestic.

2. Service of cerebral functions.

(a) *Æsthetic*, intellectual, moral.

3. Service of co-ordination.

III. (For this third class no completely satisfactory term exists. Its scope and limits are, however, as will afterwards be seen, none the less definite.)

1. Unemployed.
(By reason of youth, misadventure, refusal, &c.).
2. Disabled.
(By disease, defect, age, &c.).
3. Destructive.
(War, crime, &c.).
4. Remedial.
(Of disaster, disablement, destruction, &c.)

§ 19. Knowing now the number and quality of the members of the society, and their respective occupations, and considering that they apply the resources of nature to the satisfaction of their wants, the manner in which these are divided—in other words the partition of products, comes next to be classified. This partition, it must be observed, may be either of territory or services of potential, mediate, or ultimate products, or of tokens or claims for these.

These facts may be thus tabulated :—

- I. Mediate partition to classes A, B, C (and to members of various occupations contained in these).
 1. Of claims (currency, &c.).
 2. Of potential products.
 3. Of mediate products.
- II. Ultimate partition to A, B, C.
 1. Of territory.
 2. Of ultimate products.
 3. Of services.

In some cases the partition is *nil*; that is to say, the products, territory, &c., are held in common.

§ 20. The partition of products to the members of the society being now disposed of, there next comes to be considered the mode of their consumption or use, for which a separate but similar set of tables is therefore provided.

§ 21. Finally, since the members of society are modified (1) in

accordance with their modes of life or occupations, and (2) by their food and other material circumstances, since, in biological language, the organism is modified by its environment,* it is now necessary to inquire as to the results of the given occupations, and the given partition and use to the members following these. The biologist has accumulated a considerable body of knowledge respecting these results among animals, but comparatively little is known of human society in this respect. The foundation of an exhaustive knowledge of these results has, however, long ago been laid by the labours of the physician, the hygienist, and in a less degree by those of the educationist and philanthropist.

§ 22. These, then, are the primary tables, and we are now in a position to inquire how far our task of classifying the whole body of social statistics has been successful.

The scheme is scientific throughout—in accordance with the known truths of physical and biological science—is capable on the one hand of complete specialisation by the aid of minor tables, into the most trivial details of common life, and on the other, of generalisation into a colossal balance-sheet. Its systematic and generalised character appears clearly from a survey of the whole sheet of tables. It will be observed in the first place that the successive sets of tables, three each, may be read in horizontal rows, thus—Territory, Production, Organisms, Occupations, Partition, Use, Result. Secondly, that these sets of tables are related to each other: Organisms being treated on the same plan as Territory; the tables of Occupations being derived largely from those of Production, and the tables of Partition, Use, and Result, being in such close relation to those of Occupations that the ruling of each of the latter is exactly copied in all the four lower series; while the third, and by far the most important general view is obtained by looking at the left hand and middle vertical series (at least as far down as Occupations inclusive, and in some respects all the way), as entries on the debtor side of the balance-sheet, and similarly at the right hand vertical series as entries on the creditor side. Again, the scheme is universal in application—the tables will serve equally well for arranging our knowledge concerning any society—animal or

* This might, perhaps, more conveniently have been stated as a separate axiom.

human, civilised or savage :—for savage and animal societies, some columns here and there of course simply remaining blank. It is extremely simple, too, of understanding, and may, therefore, on all these grounds, satisfying as it does all the desiderata of a classification, legitimately claim a trial of convenience in use. In so far as the author's own studies have extended, it has proved eminently serviceable and suggestive ; and, moreover, if it be admitted to be a better classification than its predecessors, it is entitled provisionally to supersede them for working purposes, according to the universal practice of the preliminary sciences, even although itself open to criticism.

§ 23. Such, then, being the classification in its most general and abstract form, its completion—a task even more than that of any of the preliminary sciences—needing innumerable lifetimes broad and long, would require subclassification into the minutest details of social life and the filling up all the major and minor tables for each given society, with the facts of which so many are already gathered into economic and statistical libraries, and so many are being periodically collected, but of which perhaps even more await investigators, and the notation of all these by all the resources of graphic statistics. Thus, with the comparison, too, of each record with those of other communities and of antecedent times—in other words the comparison of statistics with statistics, and history with history, it is hard to speculate how vast would be the outcome of elucidated laws.*

But while this complete application is not within our reach, it must not be supposed that no application is or can be made to practice, nor that the present is a mere untested scheme. On the contrary, a very considerable number of volumes of actual statistics, journals of societies, census returns, and works on special subjects, have been gone through, without the discovery of any facts relating to any given society which could not be immediately referred to their places on the tables, while the facts relating to relations between different societies arranged themselves conveniently as links between their respective sets of tables.†

* It is interesting to compare these with the in many respects similar tables employed by Mr Spencer. See his "Descriptive Sociology."

† The reader may conveniently verify this statement by running through any such book, say a number of the *Journal of the Statistical Society*, or a

§ 24. Again, these tables, as the reader must already have noticed, embody much more than a mere classification for statistics in the narrower sense, and attempt nothing short of an organisation of the whole facts presented by the social sciences into a more definite and coherent body of knowledge than they have formed heretofore. The first series of tables, those of Territory, is intended to include the facts of political geography, while the second series is still more comprehensive. Its first table, that of Energy and Matter, includes the subjects commonly termed economic physics, economic geology, economic botany, and zoology, of which there is a large, but inco-ordinated literature.*

The table (B II.) entitled Development of Products, generalises a classification of the facts and processes of technology in the widest sense, including all the arts, coarse and fine, together with the processes of transport and exchange which the products undergo; the developmental history of any given product (which is in many respects analogous to that of an organism), being written across the table from left to right. The minor tables, as yet unpublished, of which the most important is outlined at page 14, contain a classification of all material products, potential, mediate, and ultimate. And it must not be supposed that these are mere *à priori* constructions, inapplicable to practice, the table of Development having really been worked out with a constant reference to the contents of technological encyclopædias (of which the present arrangement is usually merely alphabetic), while the minor tables are the result of many weeks' continuous attempt to classify the multitudinous contents of the last Paris Exposition, and of various smaller previous and subsequent museums of production.

In like manner the three tables devoted to the organisms accompany the Proceedings of Section F of the British Association. At most he will only occasionally have a temporary difficulty in finding where to assign any subject, and this merely for want of the minor tables.

* The names of these subjects are unsatisfactory, since scientific physics, geology, and biology have no economic aspects at all. The biologist, for instance, divides his subject into morphology, physiology, distribution, and ætiology, and finds no place for economic considerations. These subjects are really sociological ones, and should therefore be termed respectively physical economics, geological economics, botanical and zoological economics. The change is no mere verbal one, but involves a radical alteration of the point of view and mode of treatment, and indeed demands the handing over of these subjects to other cultivators.

posing society generalise the results of the daily labours of the Registrar of births, deaths, and marriages, with those of the periodic census, and these again with anthropological and educational statistics, while the three tables immediately following offer a solution of two long outstanding and highly important problems,—first, that of the classification of occupations;* and second, that of the nature of productive and unproductive labour.

Lastly, the tables of Production, Partition, and Use aim respectively at including the facts of the usual divisions of political economy—the production, distribution, and consumption of wealth; while the last—those of Result—cover, as before stated, a large but incomplete and unsystematised body of knowledge accumulated by biologists, physicians, educationists, and philanthropists, and relating to the reaction of the environment upon the organisms composing the society.

§ 25. If, therefore, it has been admitted that the series of tables are placed in order and organised into a whole, it becomes evident that the subjects just enumerated, viz., the facts of political geography, of physical, geological, botanical, and zoological economics, of technology and the fine arts, of anthropology, of demography, and of political economy have similarly been placed in order and organised into a whole. This whole body of facts treated statistically and historically, and the generalisations obtained from them, together with an account of intersocial relations, would constitute a complete account of the society, or group of societies.

§ 26. While it is evident that in our ascending progress from the preliminary sciences no shock has been felt, and no difficulty found, in the successive assimilation of the facts of political geography, physical and biological economics, technology and demography, a vast hiatus becomes evident on our approach to political economy. For here we find not a definite record of observed phenomena aiming at exhaustiveness, together with the generalisations obtained therefrom, but a multitude of contending

* See the very interesting alphabetic list of occupations in the London Directory, and the discussions as to classification in the Report of the United States Census, 1870, and Report of Census of Scotland, 1871, where detailed classifications are also given.

systems, bearing sometimes geographical names, as British school, Italian school, sometimes named after their founders, or sometimes designated by some prominent aspect of their doctrine, as Socialism, Communism, &c., each claiming orthodoxy and opposing its contemporaries obliquely or diametrically. This state of things, fortunately unique in science, makes desirable an exhaustive study and classification of all these rival systems; but within our present limits it is only possible to attempt a brief glance at their main points of difference and of agreement.

First, then, they differ as to whether the subject be a science at all, some authors regarding it as an art, others as something distinct from both. Restricting ourselves henceforth to the great majority of schools which hold the first-mentioned opinion, we find them agree in the extensive adulteration of their scientific matter with irrelevant discussions, which are occasionally of a theological nature, but much oftener metaphysical, and most frequently practical—a peculiarity which helps to explain the low esteem into which the subject has been steadily falling during the last generation, among theologians and metaphysicians, practical and scientific men alike. Such digressions are, however, common to the infancy of every department of knowledge, and must not, therefore, be too hardly dwelt upon. A more serious difficulty lies in the want of unanimity among the various schools as to the position of their subject with respect to other sciences, some spending no little labour in an endeavour to isolate it from other branches of knowledge altogether, while others claim it to be a logical science, others a mathematical, others a physical, others a biological, others a psychological, others a sociological, others an ethical science, while some hold it to belong partly to one and partly to another. In other words, the subject has been referred to every possible position in the classification of the sciences with the exceptions of astronomy, chemistry, and geology. And while it must be admitted that the teachers of these various systems are usually admirable as logicians, and that many also freely use mathematical reasonings and illustrations, they do not apply their knowledge to any great extent in the quantitative study of phenomena nor to the analysis of the facts recorded by statisticians. And again, although political economy is said to deal largely with material

things, and largely with organised beings, there is probably no department of modern literature, not even poetry or romance, so little leavened by the recent advances of our knowledge of the laws of matter and of life. To judge from their writings the economists would seem to be unconscious of the very existence of such doctrines as those of the conservation and dissipation of energy, of evolution, and the like, and of the evident fact that the students of the physical and biological sciences can hardly much longer delay a combined invasion of their territory.* Moreover, although archaic psychological conceptions—frequently, of course, of fundamental importance—are tenaciously retained, the economist usually holds aloof from considering the important constructive sociological efforts already made from the side of the preliminary sciences, while the only ethical allusion to be found in many a lengthy economic treatise is a contemptuous dismissal of “sentiment.”

Passing lightly over the disputes as to whether the subject is to be treated purely by deduction, or by induction, or by both, and evading the interminable discussions about the definition of terms, since they compel the abandonment of most of these altogether, we are arrested by the most serious discrepancy of all—that relating to the very scope and nature of political economy. We find that some schools narrow the subject to industry alone, others to government, others to value, others to exchange, so that it has actually been proposed within recent years to confine the title to the study of the commercial phenomena of the present industrial period in England, that is to say in the language of our tables, to little more than certain of the phenomena of movement at a given time in one society; while even many of those systems which take a wider view and seek to investigate production, partition, and use are often justly reproached with ignoring the organisms composing the society altogether, or at the very least with too scanty attention to the all-important results of production, occupation, partition, and use upon these organisms, while they are prone to state their generalisations of the local and the temporary as absolute laws. And, finally, we find that many of these widest systems concern themselves little with actual periodic detailed and quantitative observation of

* See Presidential Addresses to Sections A, F, G of the British Association, York, 1881.

current phenomena, and still less with historical studies, that is to say, with what we saw at the outset to be the two real aspects of the subject; while even the schools which pay most attention to statistics and to history are still far from basing their labours on the foundation of the preliminary sciences.

§ 27. But is not the preceding criticism altogether too completely destructive? In no wise, for it is only levelled against the economic systems as systems, each with pretensions to intellectual completeness. But when the claim to system and completeness is withdrawn all at once become entitled to a respectful examination. Valuable materials have been collected, constructive of scientific economics. Statistical and historical inquiry have long been in active progress; wider and wider conceptions of the range and place of social science are daily gaining ground, while those very schools which we have just been criticising for their narrowness of observation have in some respects all the more clearly focussed the subjects within their range, and have traced for us many of the most important phenomena of industry or commerce, of finance or government. And if our present limits had admitted of any detailed criticism, it would have been easy to show a certain degree of real progress on the part of many recent political economists towards the acceptance of scientific methods and ideas.*

And the real claim of the system outlined in the preceding pages lies not in its newness, for it indeed contains probably no new ideas at all, but in its serving as far as consistent with truth to represent the doctrine of each, and to harmonise the labours of all the schools. Thus, for instance, it is one of the most marked advantages of the tables that it would be easy to monograph on this principle a city or a village, a single household or even an individual, as well as a nation, to compare these facts of personal and domestic economy among each other, and to generalise bodies of these; yet this is simply a return to the conception from which political economy arose and departed, that of the study of household management and law.† Again, the postulation of the preliminary sciences, the idea of territory yielding matter and energy which manufactures and commerce

* Ex. gr. Marshall, "Economics of Industry," London, 1880. Guyot, "La Science Economique," Paris, 1881.

† Πολιτεία, οἶκος, νόμος.

can only develop into ultimate products ; these, with the classification of occupations, are the ideas of the leader of the economic Renaissance, the physician and physiologist De Quesnay, although the more advanced science of our day enables us to avoid the errors into which he fell : so, too, the larger view of industry and commerce, the detailed examination of products and processes, of mediate and ultimate partition and the like, the statistical, historical, and comparative inquiries, and, above all, the treatment of economic questions as forming not a totally isolated department of knowledge, but an integral part of the general study of man and of society, form the very essence of the "Wealth of Nations."

It would be easy to multiply examples, to show how complete and detailed a harmony of the matter and spirit of the various schools, statistical as well as economical, the scheme affords us, and how it solves so many apparently difficult and long-disputed problems ; how, for instance, the fundamental conception of organisms utilising the matter and energy of nature clears up such time-honoured disputes as those concerning the nature of interest and of intrinsic value, or how light is thrown upon such phenomena as those of competition and co-operation by the biological conceptions of struggle for existence, of physiological differentiation, of polymorphism, and of functional change. But space does not permit any further development of the scientific aspects of the subject, and it is necessary at once to proceed to the investigation of practical economics.

§ 28. Since the organisms composing society are largely occupied in utilising matter and energy ; since, moreover, every action and every movement involves some disintegration and dissipation of energy—produces, that is to say, an economic result—it is evident that an exhaustive study of practical economics would involve a quantitative record and classification of every action going on in the society. Such exhaustiveness is, of course, impossible ; but without going to any such extreme it is desirable and interesting to make some attempt. Much can, of course, be done by observing and classifying the activities we see going on around us ; but as a convenient periodic record in which most of the more important actions going on in the community find at least occasional mention is furnished by the daily newspaper, it will suffice for the present

to take it as an example, and refer each item of news to its place in our classification. Thus, taking a few at random : *—

Subject.	Society.	Subject of Table.	Minor Table.
1. Irish Land Bill.	Ireland.	Ultimate Partition.	Territory.
2. Opening of Leith Dock. }	Scotland.	Mediate Products.	Movement (Transport).
3. Funeral of —	England.	Organisms. Loss.	Death.
4. Amount of Revenue.	Britain.	Mediate Partition.	Nil. Co-ordination, &c.
5. Wreck of Shetland Fishing Fleet. }	Scotland.	{(a) Products. Loss.	Exploitation, by Storm.
		{(b) Organisms. Loss.	Death.
6. American Wheat Crop.	United States. }	Energy.	Exploitation. Veg. Food.
	Canada. }		Destructive Crime.
7. Daring Murder.	England.	{(a) Occupations. C.	Death.
		{(b) Organisms. Loss.	
8. Opening of New Hospital. }	England.	Ultimate Partition of Ult. Prod. and Services.	Occupations C. Disabled.

But such an arrangement of the actual passing economic actions, though instructive, is quite insufficient. As from our system of astronomical knowledge it is necessary to deduce the art of navigation, so from our system of sociological knowledge we must derive the art of conduct. This want has been thoroughly felt by all the different economic schools—so thoroughly indeed, as to lead, as was before remarked, to the frequent obscuring of the scientific object altogether. A classification and criticism of the practical projects of the various schools should here find place, if space permitted. This, however, may for the time being be dispensed with, since we find complete absence of unanimity, individualism being opposed by socialism, free-trade by protectionism, and so on. Thus, as we have as yet no criterion of morals or expediency, but simply our knowledge of the preliminary sciences, and since it is not the practice of the preliminary sciences to accept mere authority, such opposing schools must for the time being be considered as neutralising each other.

What, then, is to guide us in the construction of rules of practical economics? Shall we rest contented with such a survey of practical action as our classified newspaper affords us, and do as others do? This is an important principle of action, as custom and fashion bear witness, yet hardly needs detailed exposure of its

* With the limitation stated at page 19, *note 2*, the reader may continue this with any journal. See also author's paper, *Brit. Ass.* 1881, and "*Nature*," 29 Sept. 1881, for similar classification of anthropological and economic papers.

unscientific character or of the consequences into which it might lead. Shall we do, then, as others advise? Much advice certainly is current from newspapers, economic schools, and other quarters; but such authority, however often good, has already been dismissed. We are thus thrown back upon our scientific knowledge. Why should we not act upon that? Since nature yields matter and energy, let us utilise nature. Since organisms struggle for existence, let us compete; since, too, they join in united action, let us co-operate. This seems more hopeful, and might be largely developed to furnish practical axioms, tolerably coincident on the whole with the majority of existing customs and precepts. Practical rules of conduct may be made corresponding, for instance, to the table of energy (B I.), counselling us to utilise tides, coal, timber, plants, and animals. Yet if these preceding scientific grounds be accepted as sufficient for these practical actions, consistency demands the similar utilisation of the organisms composing society—that is to say, of our fellow-men, as machines, food, &c.; courses, moreover, for which there exist in many societies abundant precedents, both of custom and of counsel. Competition, too, as might easily be shown, would lead us to similar courses of action, and so on with the rest. In short, then, the development of scientific knowledge into practical action is in many cases serviceable, yet here and there without warning leads us into a course where we find ourselves confronted by a difficulty of a new order—the moral.

§ 29. How is it that every proposed course of action has thus led us into difficulties? Because we are seeking rules of action without having defined any aim of action. As we required axioms for scientific economics, so now we require postulates for action, and the latter are readily derivable from the former; thus from our first axiom that the society exists within limits of space and time, the corresponding postulate is evident—let the society exist within limits of space and time, while from the second, third, and fourth axioms the respective postulates arise—(2) let the society consist of living organisms, (3) let them seize the matter and energy of surrounding nature, (4) let them apply this to the purposes of their life, and so on; for, as it was pointed out, that as our knowledge of the nature of societies in general and in particular progresses, new axioms would necessarily be added to the most general ones with

which we started, so corresponding postulates for action would be derived from these, for in every art our code of action is the necessary complement of our scientific knowledge. This principle of practical conduct must not be mistaken for the principle last criticised, and which was seen to lead us into difficulties, that of acting upon any portion of scientific knowledge irrespective of its importance to society ; this proposes the adaptation of our action to our whole knowledge of society, and the consequent infringement of no axiom, and recognises the necessary imperfection of such action in proportion as our knowledge is incomplete. This most highly abstract form of practical economics is capable of development into detail.

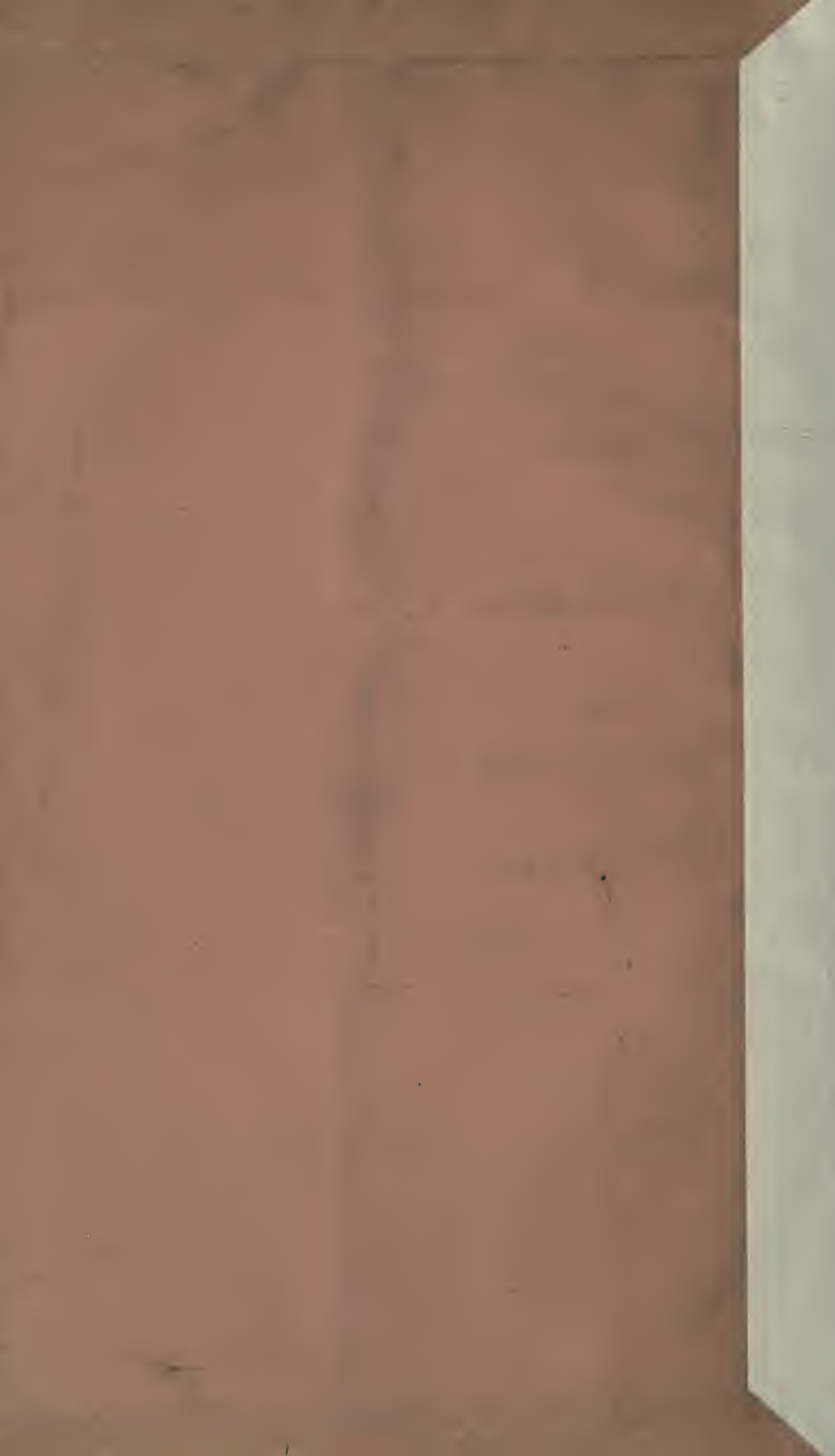
§ 30. But a higher order of considerations than the sociological came lately into view—the ethical. Reversing our usual order and beginning with the practical considerations, we recognise here as before a vast multiplicity of actions in course of actual performance in each society, termed good or bad, right or wrong, the application and definition of these terms differing somewhat in different societies and schools, custom and counsel too differing as before. An examination of these actions to which moral importance has been assigned, shows that at least many, for instance crime, remedial effort, &c., have already been included in our survey of practical economics, while a reconsideration of our economic phenomena shows that moral significance is constantly attached to common acts, say of commerce or husbandry. The interesting detailed examination of the economic aspects of actions commonly termed moral, and of the moral aspects of actions commonly termed economic, which must be left to the reader, leads to the conclusion that at least the majority of the actions going on in the society (probably indeed all) possess both aspects. Without going so far, if it be granted that certain practical actions have both economic and ethical aspects, it follows that in these given respects both moral and economic action must coincide. For if the action based upon economic science do not coincide with the action based upon ethical science (assuming such science to exist), it follows that the two sciences of sociology and ethics are not in unity ; and inversely, if this denial of the unity of science be not made, economic action must harmonise and coincide with moral action.

This coincidence of practical economics with practical ethics, of economy with morality, being implied in such common conceptions as those of conduct, duty, and the like, and indeed in almost every application of these terms, and having been often pointed out by philosophers and moralists should need little illustration, were it not that the introduction into practice of ethical conceptions, for various reasons of greater or less cogency, has been proclaimed irrelevant by not a few political economists, of whom some would indeed almost seem to have believed in a veritable antagonism of these two aspects of conduct. Such views of ethics and economics are harmonious with that want of relation to the preliminary sciences referred to in § 26 as characteristic of such economists.

Such a comparison of the two aspects of proposed actions instead of being avoided should indeed invariably be adopted. Since we saw that economic action should be based upon scientific knowledge and that not fragmentary but complete, and since our sociological knowledge is dangerously incomplete, while action is inevitable, the utility of the moral check already referred to in § 28 becomes apparent. When the counsel of economics and of morals coincide the action may be regarded as ratified and its grounds as verified, while a discord between the two must similarly be regarded as indicating that the proposed course of action whether ethical or economic must be in error. Though the course of action proposed on ethical grounds may sometimes be even more liable to error than that proposed on those of our as yet so imperfect economic knowledge, yet cases frequently occur more or less analogous to those taken for example in § 28 in which the former course is to be adopted, its accompanying emotional state then serving as a help not as a hindrance.

§ 31. Having thus reached the ethical platform we find a new series of ethical systems inviting study and criticism, but a single instance chosen almost at hazard must suffice. If practical economic action coincides with ethical action, our most general principle of economic action, which we have seen to be "act upon postulates," is also a general principle of ethical action. But this principle is essentially similar to the most abstract law of the Intellectualist system of ethics,—the Categorical Imperative of Kant,—especially when developed into its individualistic and concrete forms.

But such comparisons of the various ethical systems, however interesting, would lead into ground for unnecessary controversy. The object of the present paper, probably the first which has attempted to organise the whole body of our recorded social knowledge into a form presentable to the cultivators of the preliminary sciences, will have been sufficiently gained if the unity and continuity of these, with the social and moral sciences, has been made in some respects clearer than heretofore, and if the mode of treatment and arrangement of the facts of social science therein proposed be admitted as satisfactory and serviceable.



PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

HA
29
G4

Geddes, (Sir) Patrick
The classification of
statistics and its results

